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THIN CHITOSAN FILMS FOR APPLICATION IN PHOTODYNAMIC THERAPY

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Photodynamic therapy (PDT) is an effective treatment for human premalignant and malignant lesions because it is non-invasive, well tolerated by patients and can be performed repeatedly without cumulative side effects [1]. Chitosan crosslinked tannic acid films have been prepared to load the photosensitizer 5-aminolevulinic acid (5-ALA) to improve its outcome in PDT. The 50 μm thick film is biocompatible and biodegradable and it dissolves in physiological condition in under 24 h [2]. The surface morphology and the porosity allow an optimal 5-ALA release pattern with a pH-dependent rate.

In vitro tests on HeLa cells demonstrate an increase in phototoxicity, showed by a significant drop in cell viability after laser treatment, when the film loaded with 5-ALA was used compared to free 5-ALA demonstrating the peculiarity of the prepared film for future application in PDT.

The graph shows a considerable increase in cytotoxicity of the samples containing CS films with added 5-ALA.

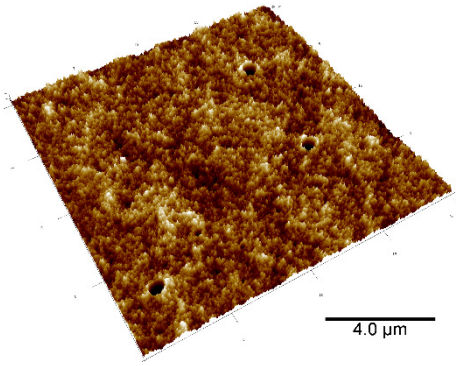

Fig. 1. *Surface morphology of chitosan crosslinked tannic acid film*

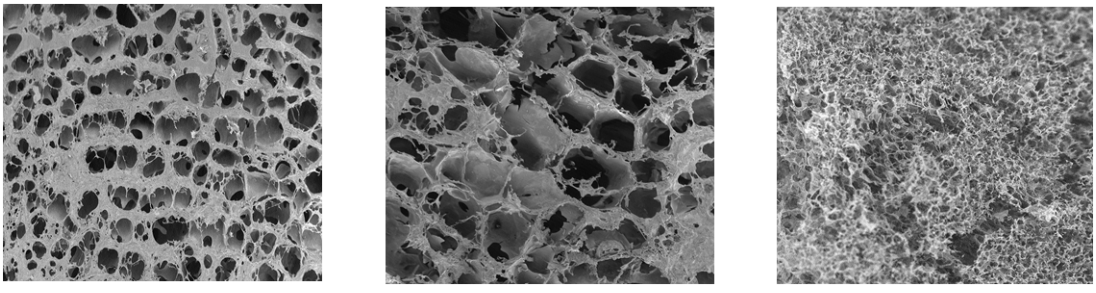

Fig. 2. *Porosity of chitosan crosslinked tannic acid film. Bar scale : A) 10 μm; B) 5 μm and C) 50 μm*

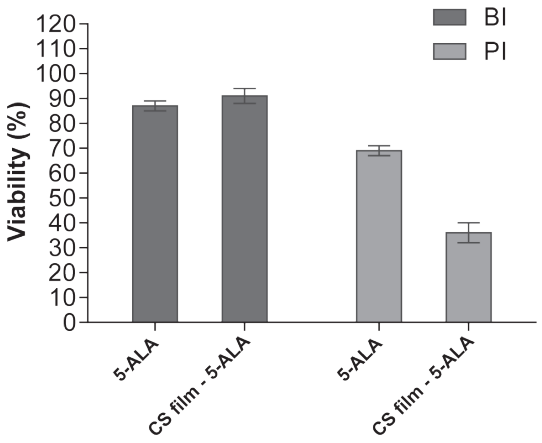

Fig. 3. *Cell viability before (BI) and after laser treatment*

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THE MODERNIZATION OF THE COLUMN CONDENSATE AND OIL STABILIZATION

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Enterprises of the oil and gas industry, like deposits on which they receive hydrocarbons, during their existence pass periods of development, prosperity and aging. The exploitation of enterprises in their period of development and prosperity is attractive for their owners. But, what to do with the enterprise, which is located on the deposit with a falling prey? Such enterprise has the equipment of high capacity, the competent personnel, and the developed infrastructure. Most owners try to reduce investments in such enterprises to a minimum, and maintain its work until it gives at least some profit.

But you can change the attitude to such the production, maked the technological process more flexible. This will allow to operate the equipment at different loading levels, to process more diverse the raw materials. Thus, it is possible to extend the life of the enterprise. Yes, the payback period will be longer than the owner would like.

How to do it? Let's consider this issue using the example of a condensate stabilization unit at the Orenburg gas processing plant, which was designed for high productivity and for processing only condensate. This plant is now subject to stabilization, not only condensate, but also oil, which causes certain technological problems.

The essential difference between oil and condensate, when stabilizing them, is a lower content of components of the raw material rising to the concentration part of the distillation column. This leads to the fact that the plates become "dry" and the efficiency of their work drastically decreases. To prevent a "dry" dish, operators increase the amount of reflex to flood the plates, or increase the temperature in the boiler, to create a larger vapor flow. To a certain extent, these actions allow improving the process of condensate or oil stabilization. But all this leads to an increased expenditure of energy.

It can be approached from the other side, it is possible to reduce the load on the concentration part